livemix™
personal monitoring system

DIGITAL AUDIO LABS

AD-24

ANALOG INPUT & DIGITAL CONVERTER

USER GUIDE

DIGITAL AUDIO LABS

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SAFETY INSTRUCTIONS

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. CONTACT DIGITAL AUDIO LABS FOR SERVICING.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated and/or potentially dangerous voltage within the products enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

POWER CORD NOTICE FOR INTERNATIONAL OPERATION
Please call Digital Audio Labs Support at 952-401-7700.

Important Safety Instructions

1. Read and understand this entire manual.
2. Keep this manual available for reference.
3. Heed all warnings and precautions in this manual and notices marked on the product.
4. Do not use this product near water or damp environments.
5. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
6. Provide for proper airflow around product. Do not install near products that produce high levels of heat. Do not expose the unit to direct sun light or heating units as the internal components' temperature may rise and shorten the life of the components.
7. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong.
8. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they connect to the product. Do not use the unit if the electrical power cord is frayed or broken.
9. Only use attachments/accessories specified by the manufacturer.
10. Unplug this product during lightning storms or when unused for long periods of time.
11. Refer all servicing to qualified service personnel. There are no user serviceable components inside the product.
12. The product shall not be exposed to moisture. Do not touch the unit with wet hands. Do not handle the unit or power cord when your hands are wet or damp.
13. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.

Care

- From time to time you should wipe off the front and side panels and the cabinet with a dry soft cloth. Do not use rough material, thinners, alcohol or other chemical solvents or cloths since this may damage the finish or remove the panel lettering.
- The Livemix system is capable of delivering high levels of volume. Please use caution with volume levels, listen with the lowest possible volume for proper operation and avoid exposure to prolonged high volume levels.
- The manufacturer cannot be held responsible for damages caused to persons, personal possessions, or data due to an improper or missing ground connection.

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DIGITAL AUDIO LABS LIMITED WARRANTY

Digital Audio Labs warrants their products against defects in material and workmanship for a period of two years from date of purchase. During this period, Digital Audio Labs will, at its option, repair the defective unit or replace it with a new or rebuilt one.

The warranty does NOT cover:

- Damage due to abuse, misuse, or accident.
- Damage due to operation contrary to the instructions in the product instruction manual.
- Units on which the product serial number has been removed or altered.
- Units that have been serviced by unauthorized personnel.

All implied warranties, including warranties on merchantability and fitness, are limited in time to the length of this warranty. Some states do not allow time limitations on implied warranties, so this limitation may not apply to you. Digital Audio Labs' liability is limited to the repair or replacement of its product. Digital Audio Labs shall in no way be held liable for incidental or consequential damages resulting from the use of their product or its software, including, without limitation, damages from loss of business profits, business interruption, loss of business information or other pecuniary loss. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Repair Policy

Please do not return the product without obtaining an RMA number first. Contact Digital Audio Labs at support@digitalaudio.com to acquire an RMA number. Do not return the product to the place of purchase. Please write the RMA number on the outside of the shipping carton. Any product sent to us without a valid RMA number will be refused. Include the following with the product: a brief description of the problem, your name, return shipping address, phone number and the RMA number. Do not include any accessories. DAL is not responsible for any damage to or loss of the product during transit. We recommend that customers obtain a receipt and tracking number for all packages shipped to us. Turnaround time on repairs is generally ten business days. If you live outside of the United States, please contact your local distributor for warranty service.

Please return product to:
Digital Audio Labs
Attn: RMA Number
1266 Park Road
Chanhassen, MN 55317
USA

Warranty Service

You will be required to pay the shipping charges when you ship your product to DAL. DAL will pay for return shipping via UPS ground. We reserve the right to inspect any product that may be the subject of any warranty claim before repair is carried out. For warranty service, we may require proof of the original date of purchase if you have not registered your product with DAL. Final determination of warranty coverage lies solely with Digital Audio Labs.

Non-Warranty Service

If it is determined that the product does not meet the terms of our warranty, you will be billed for labor, materials, return freight and insurance. There is a $50 USD minimum charge for materials and labor. Appropriate shipping charges will be applied. We require payment in advance of repair by credit card; we accept Visa and Master Card. In the event the charges are over the minimum charge, DAL will contact you and inform you of the cost of the repair before any work is completed.

CONTENTS OF BOX

- AD-24
- External 12VDC Power Supply

INTRODUCTION

The Livemix AD-24 is the analog input component for the Livemix system. The AD-24 receives line level audio signals from a mixer, snake, or interface and converts them to the Livemix Data format. Livemix audio data is sent from the AD-24 to the MIX-16 over a single shielded CAT5 or CAT6 network cable.

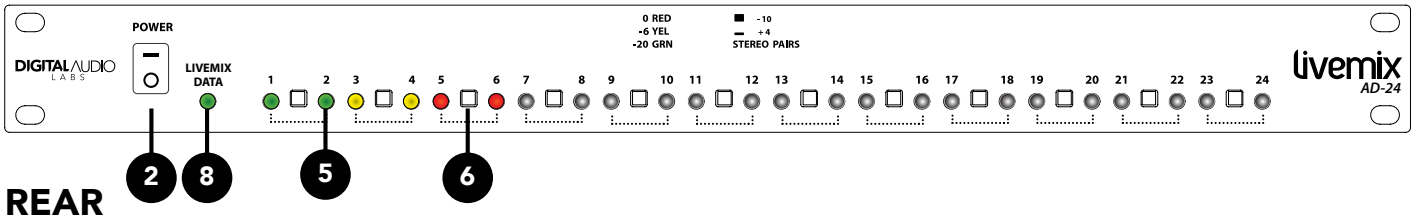
Accessible front panel controls make the Livemix AD-24 very simple to setup, while front panel LED meters allow for easy monitoring of incoming audio signals.

Livemix AD-24 features include:

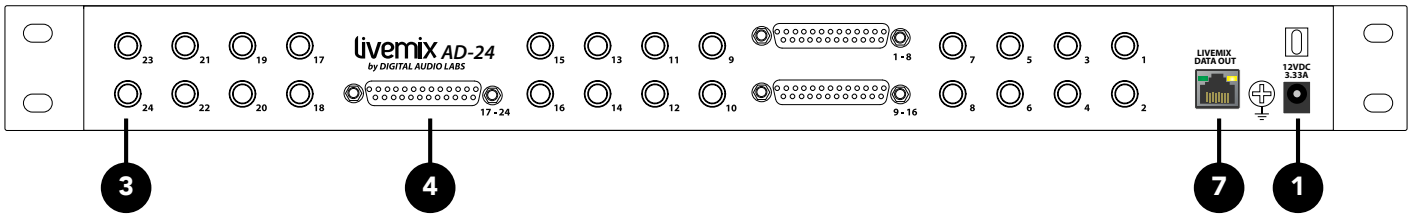
- 24 Balanced/Unbalanced Inputs
- ¼" TRS and DB-25 (D-SUB) Audio Connections
- Front Panel +4dBu/-10dBV Select Switches (1 switch per stereo pair)
- Front Panel 3-Color Input Metering
- High Quality Audio Conversion
- External 15VDC Power Supply

ANATOMY OF THE AD-24

FRONT



REAR



1. **External Power Supply Connector:** Connect the included external power supply to this jack. Make sure to only use the power supply that is supplied with your AD-24.

2. **Power Switch:** This switch turns on the power to the AD-24.

3. **¼" TRS Inputs:** These connectors accept a balanced or unbalanced line-level signal from your analog audio source. Up to 24 separate audio channels can be fed to the AD-24, all of which are available to your Livemix personal monitor mix.

   Whenever possible, we recommend using a balanced connection to the AD-24; balanced connections allow for longer cable runs and offer better interference rejection.

4. **DB-25 Inputs:** Each DB-25 connector carries eight separate channels of balanced, +4dBu audio signals, using a single multi-pin connector. Since each connector carries eight channels of audio, connections can be made more quickly (only three connections instead of 24). DB-25 connections can also be secured using screws available on the connector.

   The DB-25 connectors follow the TASCAM format. See Appendix for more information on this wiring scheme.

NOTE:
The DB-25 connectors on the Livemix AD-24 are passed through to the ¼" TRS inputs. This means that you can connect the DB-25 from your mixer, and still use the TRS jacks to connect the mixer feed to another source.

5. **Input Lights:** These lights give you a visual indication of the incoming audio signal level. Use the signal level lights as a guide, when adjusting the output volume of the signal sources that are feeding the inputs of the AD-24.

   The input lights can be one of three colors based on signal strength:

   -20dB (Green): A green light indicates a healthy signal level, and is where you want to see your signal strength most of the time.

   -6dB (Yellow): The yellow color indicates that the signal is almost too loud, and should only occur when a signal is at an occasionally loud moment.

   0dB (Red): The red color indicates that the signal is "overloading" the input, and needs to be turned down at the source. If you see red lights, the source signal needs to be turned down in volume, or the signal will be distorted as it is sent to the other parts of the Livemix system.

> **NOTE:**
> If you see a red light, it may also be an indication that you have the +4/-10 switches in the wrong position.

6. **+4dBu/-10dBV switches:** These buttons allow you to configure each pair of inputs for different types of incoming signals.

   If using unbalanced -10dBV signals, set the button to the OUT position. This setting will optimize the connectors for the lower-level signals common in consumer equipment such as a portable digital audio player, a consumer CD player, etc.

   If using balanced, +4dBu signals, set the button to the IN position. This setting will configure the connectors for the higher-level signals you would find in the direct outputs of a professional audio mixer or rack of standalone microphone preamplifiers.

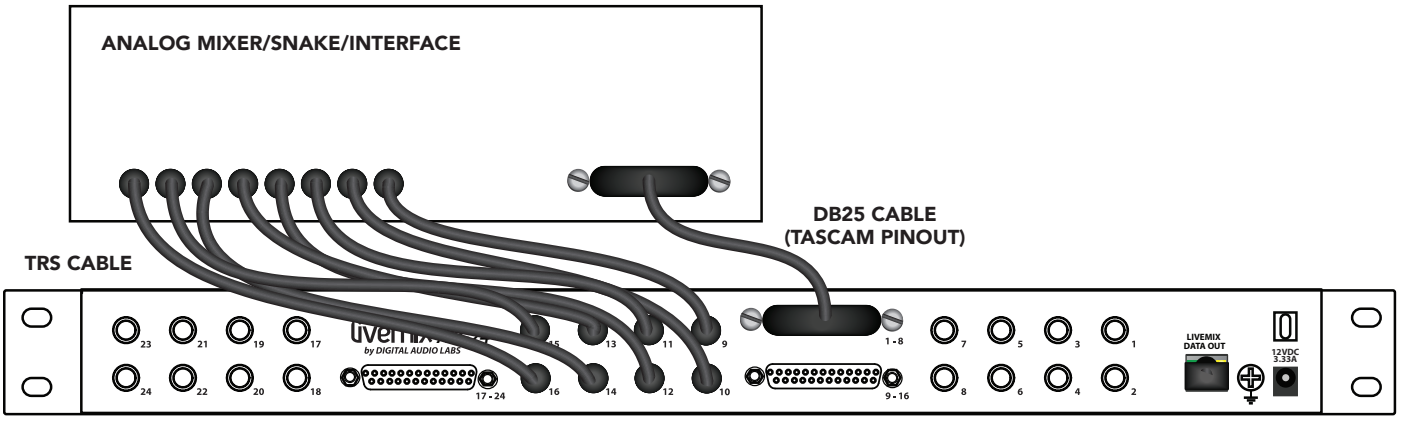
> **NOTE:**
> The AD-24 allows you to select between these two operating levels, by channel pairs. This means that you may mix and match different incoming signal sources, and do not have to choose an overall input level for all 24 channels.

7. **Livemix DATA Out:** This female RJ-45 connector is the output of the AD-24. It sends a digitized audio signal containing all 24 input channels to a MIX-16 over a single shielded CAT5 or CAT6 cable.

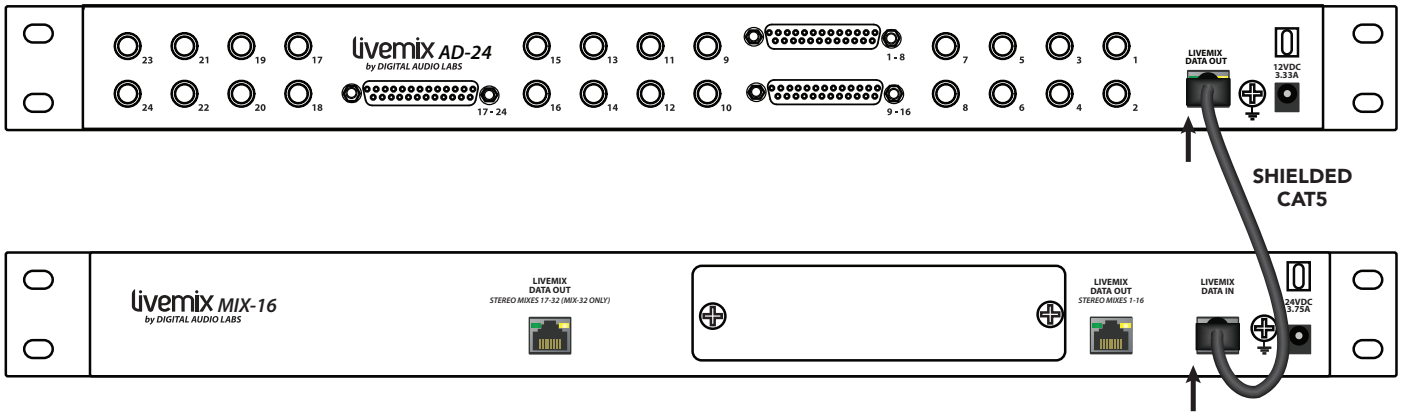
8. **Livemix DATA Light:** This light will illuminate green when the AD-24 has a valid connection and is sending data to a MIX-16. If this light is red, it is an indication that the connection to the MIX-16 is not functioning properly. A shielded CAT5 or CAT6 cable is required for proper sync.

SETUP DIAGRAMS

Connecting the AD-24 to a Mixer/Snake/Interface



Connecting the AD-24 to the MIX-16



SETUP AND OPERATION

The AD-24 will most likely be installed in a rack near the mixer, but this is not required. The MIX-16 will likely be placed near the stage. A single shielded CAT5 or CAT6 cable will connect the AD-24 to the MIX-16 and transmit all the necessary audio data for creating personal mixes.

1. Attach the external Power Supply to the AD-24 External Power Supply connector.
2. Connect the AD-24 to the analog signal source.

- Either balanced TRS or DB-25 connections are acceptable.
- If necessary, the connections can be mixed, for example, you may have channels 1-8 connected via DB-25 and channels 9-16 on TRS connections.
- The TRS and DB-25 connections are in parallel. For example, a signal input on channel 1 via DB-25 will appear on TRS channel 1. In this way, the AD-24 can pass through an analog signal from one device to another.

3. Adjust the front panel switches for the appropriate signal levels.
4. Connect the Livemix Data Out port on the AD-24 to the Livemix Data In port on the MIX-16 with the included shielded CAT6 cable.
5. Turn on the power switch to the AD-24.

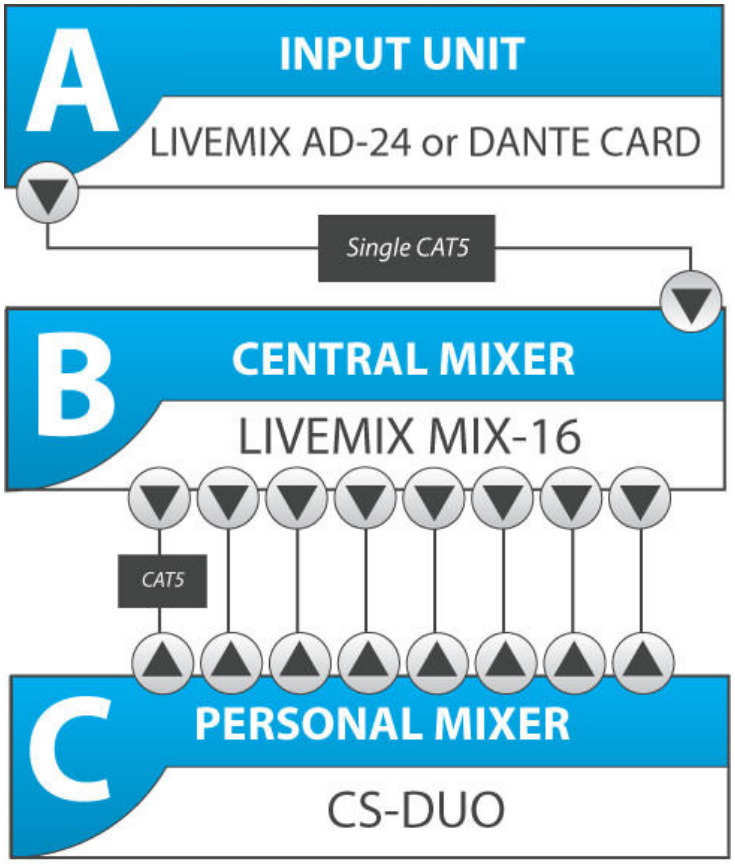
NOTE:
The most common audio source for feeding the AD-24 inputs will be the direct outs on an analog mixer.

If your mixer does not offer direct outs, you can use the inserts. If using inserts, a special cable must be used. This cable will short the Tip and Ring of the TRS cable for proper operation.

NOTE:
Networking cable comes in a variety of "flavors". For the purposes of Livemix, either CAT5 or CAT6 cabling is appropriate, but it does need to be shielded.

LIVEMIX SYSTEM OVERVIEW

There are three components required to make a Livemix system. Each system will have either an analog or digital input unit, a central mixer unit, and at least one attached control surface.



Input Options

Users with analog source material will use the AD-24. Using the TRS or DB-25 inputs, audio from the source material is made available to the Livemix system.

Users with digital source material will use the Dante Option Card (LM-DANTE-EXP). This is an option card that is installed in the MIX-16 and allows the Livemix system to receive audio from a Dante based network.

Central Mixer Options

The Livemix Central Mixer processes and distributes digital audio and power to connected Control Surfaces. Control up to 16 personal mixes with the Livemix MIX-16.

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Control Surface

Livemix needs at least one connected controller to make a mix. Livemix Bundles (both Analog and Digital) come with 4 Livemix CS-DUO units for a total of 8 personal mixes. Each Livemix CS-DUO connects via network cable to one of the ports of the MIX-16. Using various controls on the unit, two users can each create their own custom mix, which is then output to headphones, in-ear monitors or stage monitors, right from the CS-DUO unit.

TROUBLESHOOTING

My AD-24 is not turning on, and I do not see the power light illuminating.

Check to make sure that you have the AD-24's external power supply connected to a working power outlet.

I do not see the Livemix Data light illuminating, on the front panel.

If the Livemix Data light is not illuminating, there is a problem with the power to the AD-24. Check to make sure that the power supply is connected to the AD-24 and that all the cables are secure. Also check to ensure that the power supply is plugged into an appropriate power source and that the power cable from the source to the power supply transformer is securely attached.

The signal levels coming in to the AD-24 are way too loud/way too soft.

- Adjust the +4/10 level buttons on the front panel of the AD-24.
- If feeding the AD-24 from a consumer-level, -10dBV signal, set the level switches for -10
- If feeding the AD-24 a professional-level, +4dBu signal, set the level switches for +4

I have set the +4/-10 switches to the correct setting, but the levels on some input channels are still a little too soft/loud. How can I further fine tune the levels coming into the AD-24?

The AD-24 does not offer individual input gain control for each channel; if you want to fine tune the signals further, you will need to adjust the strength of the audio signal directly from its source. In most cases the source will be an analog mixing console that is also being used to provide the live sound mix in the venue.

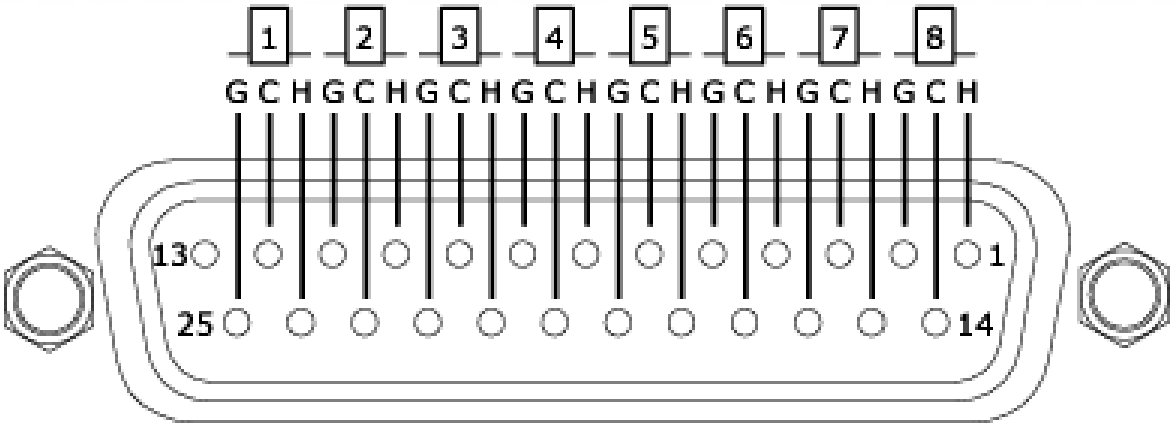
In this case, you should be able to find a setting for each mixer channel's gain knob, that works well both for the mixing console itself, as well as the signals being sent from the consoles direct outputs, to the inputs of the AD-24.

Every time I set up our equipment at an event, it takes a long time to connect 24 separate ¼" cables, from the direct outputs of the mixing console, to the 24 ¼" inputs of the AD-24. Is there an easier way?

The AD-24 also offers three separate 25-channel DB-25 connectors on its rear panel, each accepting 8 channels through a single multi-pin connector. By using cabling that terminates on the AD-24 side using DB-25 connectors instead of ¼", you can feed all 24 inputs using only three connections, instead of 24 separate ones.

APPENDIX

TASCAM DB-25 pin out



LIVEMIX SUPPORT

Phone Support: 952-401-7700
Toll Free: 844-DAL-INFO
Email Support: support@digitalaudio.com
Website: www.digitalaudio.com/support

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TECHNICAL SPECIFICATIONS

AD-24 (ANALOG CHARACTERISTICS)

THD+N	.001%
S/N Ratio	111 dB
Frequency Response	20 Hz – 22KHz ± .5dB
Crosstalk	-92 dB
Maximum Input Level	+24 dBu (minor distortion above 23.5dBu, hard clip at +24 dBu)
Input Impedance	20KΩ Balanced, 10KΩ Unbalanced
Max cable length from MIX-16	300 Feet

LIVEMIX SYSTEM SPECIFICATIONS

THD+N (18 dBu 1KHz input)	.03% (100mW, 22Ω Load)
	.014% (100mW, into 32Ω Load)
	.005% (100mW into 64Ω ohms)
	.003% (100mW into 300Ω)
S/N Ratio	103dB
Frequency Response	20Hz-22KHz ± 3dB
Crosstalk (Left to Right)	-103 dB
Latency	1.5 mS

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